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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/392,208	09/08/1999	WILLIAM CLAYTON SCOFIELD	OXMO-24.721	9767

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EXAMINER

BRINEY III, WALTER F

ART UNIT	PAPER NUMBER
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2644

DATE MAILED: 06/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/392,208	Applicant(s) SCOFIELD ET AL.	
	Examiner Walter F. Briney III	Art Unit 2644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 February 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15, 17-33, 35-45, 47, 49-54 and 56-60 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15, 17-33, 35-45, 47, 49-54 and 56-60 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. **Claims 31, 32 and 45 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

Claims 31 and 32 both recite the limitation "claim 16" in line 1. Because claim 16 has been cancelled, there is insufficient antecedent basis for this limitation in the claims. It is assumed for the purposes of this office action that the claims were meant to recite and depend on claim 15, which now incorporates all limitations of claim 16.

Claim 45 recites the limitation "claim 34" in line 1. Because claim 34 has been cancelled, there is insufficient antecedent basis for this limitation in the claim. It is assumed for the purposes of this office action that the claim was meant to recite and depend on claim 33, which now incorporates all limitations of claim 34.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 15, 21, 27-30, 32, 33, 39, 47, 51, 54, and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamatsu (US Patent 5,524,053) in view of Gehring (US Patent 5,521,981).

Claim 15 is limited to *a method for real-time virtual positioning of a sound source in three-dimensional space as perceived during playback*. Iwamatsu discloses a sound field control device, which decodes a Dolby surround-sound signal and subsequently mixes the decoded signal into both a left and right output signal. See Abstract, figure 6, and column 6, lines 42-59. Clearly, the surround-sound is not binauralized, in the sense that it is not processed and mixed in such a way as to simulate natural human hearing; the signals are instead physically placed around a user. The left and right output signals provided to speakers (84) and (86), respectively, are generated by a process that simulates the aforementioned natural human hearing by placing each decoded signal in some part of an *azimuthal plane*. However, it is clear from the figures, that the speakers (84) and (86) are mounted within a television or other image reproduction screen. Thus, the *output signals* are not played *through a localized speaker headset*.

The examiner takes Official Notice of the fact that headsets with both a left and right speaker was well known at the time of the invention. Headsets are recognized to provide a more personal listening experience. They block out noise from the outside world, and also serve to contain sounds, such that a person in the same room as the listener would not be disturbed. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a headset as the output device instead of the loudspeakers mounted within the video reproduction device disclosed by Iwamatsu for

the purpose of containing the auditory environment to the user, such that another person in the same room would not be disturbed.

Returning to Iwamatsu, it is seen in figure 6, that a plurality of locations dispersed over the azimuthal plane relative to the listener are generated, namely: front-left, front-right, real-left, and rear-right. These locations are digitally generated and approximated by the reflected sound generators (142) and (154). In the end, all these signals are mixed together (104) and (106) to form the left and right output. It is clear, however, that none of these positions correspond to elevation information (i.e. *repositioning select ones of the virtual locations to apparent positions above and below the azimuthal plane*).

The prior art admitted by Gehring teaches a three-dimensional sound processor, which operates in real-time, such as the sound processor of Iwamatsu. The difference is that the processor taught by the prior art uses an HRTF, which is specifically designed for reproducing spatialized signals with a headset. See column 1, lines 30-40 and column 1, line 63 to column 2, line 13. The HRTF is then responsible for translating its input signal into a plurality of localized sources within a three-dimensional plane as seen in figure 1. It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the reflected sound generators of Iwamatsu with the processors taught by the prior art admitted by Gehring for the purpose of applying an HRTF to the signal input, which is three-dimensional and which provides better spatialization for headset reproduction because it at least compensates for in-the-head noises.

Claim 33 is essentially the same as claim 32, as covered by Iwamatsu in view of Gehring, with the further limitations of *inputting a stereo audio signal from a video program prerecorded to include surround sound audio and decoding the surround sound audio to provide a plurality of surround sound signals*. However, these limitations are clearly supported by Iwamatsu; in particular, Iwamatsu describes in connection with figure 6, a Dolby surround-sound decoder (130), which generates audio from either a laserdisc or videotape. See column 6, lines 42-54. Therefore, Iwamatsu in view of Gehring makes obvious all limitations of the claim.

Claims 47 and 54 are essentially the same as claims 15 and 33, respectively, and are rejected for the same reasons.

Claim 21 is limited to *the method of claim 15*, as covered by Iwamatsu in view of Gehring. Iwamatsu discloses decoding audio from either a laser disc or videotape, and the processing of the decoded audio to binaural represents *associating a video image with the non-binauralized input sound signal*. See column 6, lines 51-55. Therefore, Iwamatsu in view of Gehring makes obvious all limitations of the claim.

Claims 39, 51 and 58 are essentially the same as claim 21, and are rejected for the same reasons.

Claim 27 is limited to *the method of claim 15*, as covered by Iwamatsu in view of Gehring. It is clear upon inspection of figure 6 of Iwamatsu that the synthesis circuit (136) generates the input for the sound generator (142). The input is a summation of the L, C, and R signals, and is thus a *monaural sound signal*. Therefore, Iwamatsu in view of Gehring makes obvious all limitations of the claim.

Claim 28 is limited to *the method of claim 15*, as covered by Iwamatsu in view of Gehring. It is clear upon inspection of figure 6 of Iwamatsu that the Dolby decoder (130) generates stereo outputs, which are used as input to the sound generator (142) (i.e. *wherein the non-binauralized input sound signal is a stereo sound signal*). Therefore, Iwamatsu in view of Gehring makes obvious all limitations of the claim.

Claim 29 is limited to *the method of claim 15*, as covered by Iwamatsu in view of Gehring. It is clear upon inspection of figure 6 of Iwamatsu that the Dolby decoder (130) generates surround-sound outputs, which are used as input to the sound generator (142) (i.e. *wherein the non-binauralized input sound signal is a surround sound signal*). Therefore, Iwamatsu in view of Gehring makes obvious all limitations of the claim.

Claim 30 is limited to *the method of claim 15*, as covered by Iwamatsu in view of Gehring. Surround-sound can be considered binaural in the sense that it positions sounds with respect to the listener, i.e. left, right, center, and surround signals (*wherein the input sound signal is a binaural sound signal*). Therefore, Iwamatsu in view of Gehring makes obvious all limitations of the claim.

Claim 32 is limited to *the method of claim 15*, as covered by Iwamatsu in view of Gehring. It is clear from reviewing each cited reference, that there is no mention of tracking the user's head movements, such that the sounds recreated in the headsets are produced based only on the HRTF functions and the original input signals (i.e. *wherein the perceived virtual locations of the sound signals do not vary with movement*).

of the listener or of the listener's head in the azimuthal plane at the listening location).

Therefore, Iwamatsu in view of Gehring makes obvious all limitations of the claim.

3. **Claims 31 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamatsu in view of Gehring and further in view of Begault (US Patent 5,173,944).**

Claim 31 is limited to *the method of claim 15*, as covered by Iwamatsu in view of Gehring. Because an HRTF as taught by Gehring is applied to the input surround-sound signal the process following the elements within block (28) of Iwamatsu, figure 6 are unknown. In addition, the real-time digital signal processing components suggested by Gehring are not complete in their disclosure. Therefore, Iwamatsu in view of Gehring make obvious all limitations of the claim with the exception of *changing attributes of the signals representing the non-binauralized input sound signals, the attributes selected from the group including intensity, phase, and signal delay*.

In order to resolve the aforementioned deficiencies, attention is drawn to Begault. In particular, Begault teaches a real-time processor that converts a single input channel into two binaural channels. See figure 2. Specified amounts of *delay*, gain (i.e. *intensity*), and variable transfer functions are applied. It would have been obvious to one of ordinary skill in the art to implement the digital signal processor as taught by Begault because neither Iwamatsu nor Gehring disclose the details of an HRTF-capable processor, which is absolutely necessary for them to function together.

Claim 45 is essentially the same as claim 31, and is rejected for the same reasons.

4. Claims 18-20, 36-38, 50, and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamatsu in view of Gehring and further in view of Görike (US Patent 4,158,753).

Claim 18 is limited to *the method of claim 15*, as covered by Iwamatsu in view of Gehring. The rejection of claim 1 relied upon the well-known fact that headsets are a reasonable alternative to loudspeakers for reproducing sounds. However, this basic idea does not suggest any of the structure of the headset. Therefore, Iwamatsu in view of Gehring makes obvious all limitations of the claim with the exception of *supporting the left and right loudspeakers proximately in the plane of the zygomatic arch of the listener in rearward facing relationship with respect to the listener's head*.

Görike teaches a headphone of circumaural design. See Abstract and figure 4. The headphone taught by Görike positions each speaker in a forward section of the ear cup, so that the produced sounds are received from the front, preserving the natural ear resonance (i.e. *proximately in the plane of the zygomatic arch...in rearward facing relationship...to the listener's head*). See column 4, lines 14-21. It would have been obvious to one of ordinary skill in the art to use the particular headset as taught by Görike for the purpose of preserving the natural ear resonance during stereophonic reproduction.

Claim 19 is limited to *the method of claim 18*, as covered by Iwamatsu in view of Görike. As is clearly seen in figure 4 of Görike, the loudspeakers themselves are removed from the ear, inherently preserving the ear's *conch* resonance. Therefore, Iwamatsu in view of Görike makes obvious all limitations of the claim.

Claim 20 is limited to *the method of claim 18*, as covered by Iwamatsu in view of Görike. As indicated by Görike, the speakers themselves are removed from the ears,

see figure 4, and are so positioned to defeat the effect of in-the-head localization and preserve the natural ear resonance (i.e. *such that the natural left-right and right-left separation of signals by the listener's head is maintained*). See column 3, lines 1-3 and column 4, lines 14-21. Therefore, Iwamatsu in view of Görike makes obvious all limitations of the claim.

Claims 36-38 are essentially the same as claims 18-20, respectively, and are rejected for the same reasons.

Claims 50 and 57 are essentially the same as claim 18, and are rejected for the same reasons.

5. **Claims 17, 22-26, 35, 40-44, 49, 52, 53, 56, 59, and 60** are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamatsu in view of Gehring and further in view of Miyamori et al. (US Patent 5,537,165).

Claim 22 is limited to *the method of claim 21*, as covered by Iwamatsu in view of Gehring. Iwamatsu discloses converting a plurality of surround-sound channels into a two-channel stereo output. See Abstract. In the rejection of claim 1, it was shown that it would have been obvious to reproduce the two-channel stereo output using a pair of headphones instead of the loudspeakers used by Iwamatsu. However, this combination results in there being no *external loudspeaker*.

Because Iwamatsu is trying to reproduce stored audio that simulates a theatrical presentation, it is reasonable to compare the setup depicted in figure 6, with a normal auditorium setup. To this end, Miyamori teaches a typical auditorium style speaker setup. While the surround-sound system of Miyamori is adequate, it does not include a

subwoofer component. Miyamori teaches that the subwoofer (103) effectively outputs the sound felt as vibrations, rather than the low-range sound, such as the sound of explosion, and may be effectively employed for a scene of explosion and so forth. See column 7, lines 41-46. In addition, it is clear from figure 4 of Miyamori, that the subwoofer is directed toward the auditorium, and positioned in the line of sight from the central portion of the video screen. In addition, figure 3 of Miyamori illustrates the electronic decoding elements that are needed to further enable the system of Iwamatsu to reproduce such low sounds. In particular, an extra SW channel is needed, as well as a data selector (23b), which receives both the SW channel and a mixture of an AL and AR channel in case of data corruption on the movie medium. See Abstract and column 6, lines 22-39. It would have been obvious to one of ordinary skill in the art at the time of the invention to include a subwoofer as taught by Miyamori to enable the reproduction of explosions and other tactile vibrations, which clearly cannot be reproduced by headphones alone, in addition, it would have been obvious to include the decoding means as taught by Miyamori including the subwoofer synthesizer for mitigating effects of corrupted data.

Claim 23 is limited to *the method of claim 22*, as covered by Iwamatsu in view of Gehring and further in view of Miyamori. As indicated in the rejection of claim 21, Miyamori teaches mixing portions of the decoded and non-binauralized signal to create a pseudo subwoofer channel, capable of being used in place of the subwoofer channel in the event of data corruption (i.e. *wherein the step of reproducing comprises the steps of: selecting portions of each channel of the non-binauralized input sound signal;*

blending the selected portions according to a predetermined mixing plan to generate a composite sound signal; and coupling the composite sound signal to the external loudspeaker). See column 6, lines 22-39. Therefore, Iwamatsu in view of Gehring and further in view of Miyamori makes obvious all limitations of the claim.

Claim 17 is essentially the same as claim 23, and is rejected for the same reasons.

Claim 24 is limited to *the method of claim 22*, as covered by Iwamatsu in view of Gehring and further in view of Miyamori. It is inherent that the output of the subwoofer will contain voice energy, as it is a composite of both left and right channels. Even though the channels were low-pass filtered, residual voice will remain (i.e. *wherein the portion of the non-binauralized input sound signal reproduced by the external loudspeaker comprises voice sounds*). See column 6, lines 33-39. Therefore, Iwamatsu in view of Gehring and further in view of Miyamori makes obvious all limitations of the claim.

Claims 25 and 26 are limited to *the method of claim 22*, as covered by Iwamatsu in view of Gehring and further in view of Miyamori. As shown in the rejection of claim 24, the pseudo subwoofer channel is composed of the left and right audio channel, both of which are low-pass filtered (i.e. *wherein the select portion of the audible frequency spectrum of the non-binauralized input sound signal includes low-frequency tones*). Therefore, Iwamatsu in view of Gehring and further in view of Miyamori makes obvious all limitations of the claim).

Claims 35 and 40-44 are essentially the same as claims 17 and 22-26, respectively, and are rejected for the same reasons.

Claims 49 and 56 are essentially the same as claim 17, and are rejected for the same reasons.

Claims 52 and 59 are essentially the same as claim 22, and are rejected for the same reasons.

Claims 53 and 60 are essentially the same as claim 23, and are rejected for the same reasons.

Response to Arguments

Applicant's arguments filed 09 February 2005 have been fully considered but they are not persuasive.

With respect to claim 15, the applicant alleges on page 13 of the current response that the new limitation implies that not all of the virtual locations are repositioned but only select ones and that the teachings of Gehring do not suggest positioning only select ones; the examiner respectfully disagrees. The system described by Gehring is enabled to process any input signal and place it anywhere in a three-dimensional space. Clearly, not all inputs are going to be desirably located above or below a listener at all times, which is evident from the fact that in natural surroundings, humans localize sounds from above, below and in plane with the hearing azimuth. Therefore, while there is no control system taught by Gehring to indicate how virtual locations are selected to be repositioned, simply reciting that only select ones of

the virtual locations are repositioned above and below the azimuthal plane does not distinguish over the prior art.

With further respect to claim 15, the applicant alleges on page 14 of the current response that Iwamatsu does not describe binauralizing a non-binauralized input signal, and while the examiner disagrees, this argument is moot, as amended claim 15 no longer recites *binauralizing a non-binauralized input sound signal*. Therefore, the rejection of claim 15 as amended to include the limitations of claim 16 is maintained for the above reasons.

With respect to claim 33, the applicant alleges on page 14 of the current response that claim 33 is allowable over the prior for at least the reasons treated above with respect to claim 15 and because the new limitations that are essentially the same as those of claim 46 are not taught by the combination of Iwamatsu and Gehring; the examiner respectfully disagrees. Claim 33 recites *wherein the perceived virtual locations of the sound signals do not vary with movement of the listener or of the listener's head in the azimuthal plane at the listening location*. The interpretation made by the examiner was that the invention of the applicant does not make use of well known head position tracking mechanisms, which enable the adaptive update of the HRTF's used for three-dimensional sound positioning. Since Iwamatsu, the base reference, clearly does not modify the output signals based on the listener's position as evidenced by the lack of feedback in figure 6, and because Gehring fails to even mention doing so, it follows that the combination of Iwamatsu and Gehring do not track head movement, and that the positioned sounds are reproduced in the same location

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regardless of the position of the user's head. Also, as the loudspeakers of Iwamatsu were replaced with headphones in the rejection of claim 15, the reproduced sounds are physically reproduced in the same positions no matter what position the listener's head is in, and in view of the above examiner's rebuttal, the perceived sounds are also reproduced in the same positions. Therefore, the rejection of claim 33 as amended to include the limitations of claims 34 and 46 is maintained for the above reasons.

With respect to claims 17-32, 35-45, 47, 49-54 and 56-60, the applicant alleges on page 15 of the current response that these claims are allowable over the cited prior art for at least the reasons treated above with respect to claims 15 and 33. As these arguments were shown to be unpersuasive, the rejections of these claims are maintained.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter F. Briney III whose telephone number is 571-272-7513. The examiner can normally be reached on M-F 8am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh Tran can be reached on 571-272-7564. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



SINH TRAN
SUPERVISORY PATENT EXAMINER

WFB
6/8/05